

PRICE

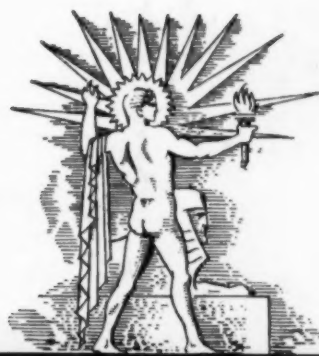
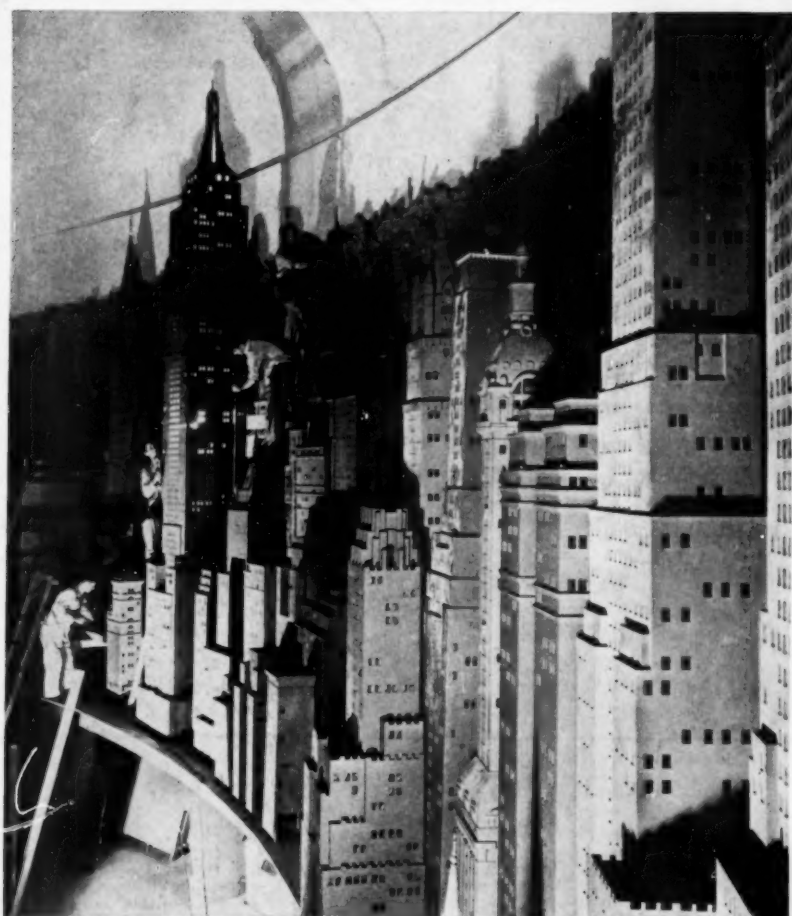
15¢

TECHNOLOGY DEPT.

PUBLIC

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



February 4, 1939

Architects of Lilliput

See Page 69

A SCIENCE SERVICE PUBLICATION

Do You Know?

The Soviet whaling flotilla has killed about 2,000 whales in six years of hunting.

Two smooth tires on the same side of a car give the effect of unequalized brakes.

Twelve inches of firmly drifted snow means four inches of water for the ground beneath.

Karakul lambs in varying stages of development are the source of broadtail, Persian lamb, and caracul furs.

It is reported that practically every rubber article now made in Germany contains some reclaimed rubber.

The dividing line between a deficit and savings in many farmers' experience is around \$600 net cash for the year.

A scientist who has been taking tree temperatures with a "clinical thermometer" finds that trees apparently do not have fevers.

Hardwood trees, such as oak and beech, are more exacting in the soil and micro-organisms needed for their growth than are cone-bearing trees.

A new High School of Automotive Trades in Brooklyn, N. Y., is equipped with 26 shops and nearly 100 new cars, to help 1,600 students to learn lessons in repair and maintenance.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

ANTHROPOLOGY

Where are sanctuaries planned for savages? p. 78.

ARCHAEOLOGY

Who is digging again at Olympia? p. 72.

ASTRONOMY

How many super-novae have been discovered? p. 67.

ENGINEERING

How many windows are there in the world's largest diorama? p. 69.
What problems do air-conditioning engineers face? p. 69.
What does fog do to sulfur in the air? p. 74.
In how many ways is artificial cold useful? p. 75.

ETHNOLOGY

What was ancient Egypt's basic religious conflict? p. 70.

HISTORY OF SCIENCE

Who was the foremost naturalist of Rome? p. 77.

MATHEMATICS

What are your chances of being bombed? p. 73.
What role does probability play in your life? p. 76.

MEDICINE

What is psychosomatic medicine? p. 72.
Of what disease do most "cured" TB patients die? p. 72.

PALEONTOLOGY

Where is the newest find of fossils in asphalt? p. 67.

PHYSIOLOGY

How many hormones can one gland produce? p. 73.

PHYSICS

How does Cornell University's atom-smasher differ from others? p. 68.
Where has skiing been scientifically studied? p. 68.
What is "piped light"? p. 76.

POPULATION

How many daughters do Swedish mothers have? p. 74.
Why are families growing smaller? p. 76.

PSYCHOLOGY

What clash of opinions is now affecting American education? p. 73.
Is your hearing colored? p. 75.

RESEARCH

What institutions spend most money for scientific research? p. 77.

SOIL CONSERVATION

How many trees planted in soil conservation programs are still living? p. 78.

TEXTILES

Could bacteria destroy your clothes? p. 72.

VOLCANOLOGY

How can cooling rocks produce hot lava? p. 69.

Once infantile paralysis becomes established in a locality it recurs there at intervals of two to five years, judging by statistics since 1916.

The American School of Oriental Research in Jerusalem is so located that its grounds contain part of the third wall of Jerusalem, built by Herod Agrippa I and Josephus.

Archaeologists in Salonica are rebuilding the famous fifth century church of St. Demetrius which was badly gutted by fire in the World War period.

Pennsylvania scientists recently measured sleet drop sizes by collecting the icy drops on a scaled surface and observing the differences in size through a magnifying lens.

SCIENCE NEWS LETTER

Vol. 35 FEBRUARY 4, 1939 No. 5

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 2101 Constitution Avenue, Washington, D. C. Edited by WATSON DAVIS.

Subscriptions—\$5.00 a year; two years \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Members of the American Association for the Advancement of Science have privilege of subscribing to SCIENCE NEWS LETTER at the reduced price of \$3 per year. Applications for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington, D. C.

In requesting change of address, please give your old address as well as the new one, at least two weeks before change is to become effective.

Copyright, 1939, by Science Service, Inc. Reproduction of any portion of SCIENCE NEWS LETTER is strictly prohibited. Newspapers, maga-

zines and other publications are invited to avail themselves of the numerous syndicate services issued by Science Service.

Cable address: Scienserve, Washington.

Entered as second class matter at the post-office at Washington, D. C., under the act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark. U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature and in the Engineering Index.

Advertising rates on application. Member Audit Bureau of Circulation.

SCIENCE SERVICE is the Institution for the Popularization of Science organized 1921 as a non-profit corporation, with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the journalistic profession.

Board of Trustees—Honorary President: William E. Ritter, University of California. Representing the American Association for the Advancement of Science, J. McKeen Cattell, Editor, Science, Garrison, N. Y.; Henry B. Ward, University of Illinois, Urbana, Ill.; Edwin G. Conklin, President, American Philosophical Society, Philadelphia, Pa. Representing the National

Academy of Sciences, W. H. Howell, Vice-President and Chairman of Executive Committee, Johns Hopkins University, Baltimore, Md.; R. A. Millikan, Director, Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, Calif.; Harlow Shapley, Director, Harvard College Observatory, Cambridge, Mass. Representing National Research Council, C. G. Abbot, Secretary, Smithsonian Institution, Washington, D. C.; Harrison E. Howe, Editor of Industrial and Engineering Chemistry, Washington, D. C.; Ross G. Harrison, Director, Osborn Zoological Laboratory, Yale University, New Haven, Conn. Representing Journalistic Profession, John H. Finley, Editor, New York Times; J. Edwin Murphy, Managing Editor, Baltimore Evening Sun, Baltimore, Md.; O. W. Riegel, Director, Lee School of Journalism, Washington and Lee University, Lexington, Va. Representing E. W. Scripps Estate, Harry L. Smithson, Treasurer, Cincinnati, Ohio; Warren S. Thompson, Miami University, Oxford, Ohio.

Staff—Director, Watson Davis; Writers, Frank Thone, Emily C. Davis, Jane Stafford, Marjorie Van de Water, Robert Potter, Leonard H. Engel; Correspondents in principal cities and centers of research. Photography: Fremont Davis; Librarian: Minna Gill; Sales and Advertising: Hallie Jenkins, Austin Winant, Howard Bandy.

ASTRONOMY

Comet and Super-Nova Make January a Notable Month

Amateur and Professional Share Discovery Honors; Both Have Scored in Previous Astronomical Finds

THE YEAR'S first comet has been discovered low in the northwest sky by Leslie C. Peltier, noted amateur astronomer of Delphos, Ohio. Mr. Peltier, designer of children's toys by day and student of the stars by night, reported the discovery to Harvard Observatory, which bulletined it in code to all observatories.

In an exclusive interview with Science Service the 39-year-old amateur stargazer explained that the new comet is the seventh he has discovered in 23 years of comet hunting. When found, the new stellar object was of the eighth magnitude of brightness, just too faint to be seen with the naked eye. It is easily visible through the six-inch refracting telescope of Princeton University which Mr. Peltier has been using, on loan, for the past 15 years.

Near the constellation of Pegasus, the new comet's location was right ascension 21 hours and 20 minutes and its declination 28 degrees north. Whether the comet has a tail or is in rapid motion is yet undetermined, for unfavorable observing conditions permitted Mr. Peltier to see it for only ten minutes at about 8 p. m. on Jan. 19.

Russian Shares Honors

Confirmation of the discovery was supplied by Lick Observatory at Mt. Hamilton, Calif., and Yerkes Observatory at Green Bay, Wis. Calculations of the orbit at Harvard College Observatory indicate that the comet will not become visible to the unaided eye.

The comet, found Jan. 19 in America, will become known as the Cosik-Peltier comet for, it is now disclosed, it was reported by a Russian amateur, Cosik, just a few hours before Peltier found it. Astronomer Beljawski, director of the Pulkova Observatory, had an accurate determination of position and motion of the new comet before Peltier discovered it, states Harvard Observatory.

A tremendous stellar explosion — a super-nova star which probably has a brightness hundreds of millions of times that of the sun—was reported by Prof.

Fritz Zwicky at Mt. Palomar Observatory of the California Institute of Technology.

Eighteenth in History

The super-nova is only the eighteenth reported in astronomical history. It was first discovered by Prof. Zwicky in the eastern sky with his small but powerful Schmidt type telescope-camera. On Jan. 17 its magnitude was approximately 14. Three days later, on Jan. 20, the brightness had increased to magnitude 12.

The super-nova is so distant that it cannot be seen with the unaided eye despite its brilliance. Its general location is almost directly east. It rises above the horizon about midnight and reaches the meridian position at 5 a.m.

As the super-nova comes into view it is near the constellation of Leo and approximately on a line between the beta star of this constellation and the bright star Spica in the constellation of Virgo.

The position of the super-nova, as

given in a telegram from Harvard Observatory, distributing center for astronomical news, was right ascension 12 hours 40 minutes and declination north 3 degrees, 1 minute.

The super-nova star is located near the nucleus of the nebula known as NGC 4636, listed in the nebula catalogue of Sir John Herschel, famed 19th century British astronomer, as being a bright, large and irregularly shaped nebula. The nebula is resolvable into individual stars. It is one of these stars which apparently has flared up into super-brilliance.

Science News Letter, February 4, 1939

PALEONTOLOGY

Many Bones Found in Russian Asphalt Pit

BONES in an asphalt pit, like the famous Rancho la Brea deposits in Los Angeles, U. S. A., have been found near Baku on the Caspian Sea, in the great oil region of the southern U. S. S. R., reports Tass. The fossils occur in an ancient lake of asphalt about 300 square yards in extent and two yards deep.

Along with bones of cave lion, bear, hyena and other extinct animals are found also the remains of existing species. For ages the slowly oozing asphalt has been a trap for birds and mammals.

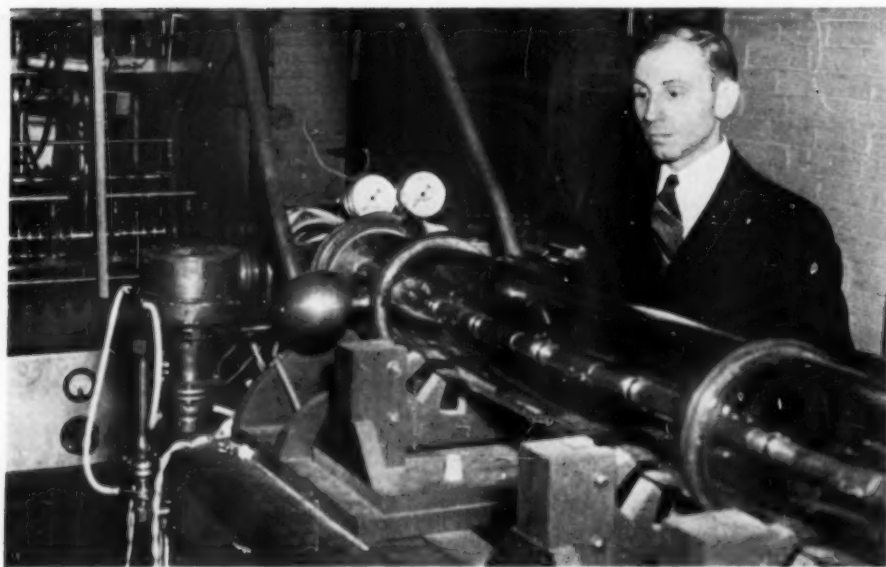
Science News Letter, February 4, 1939

Farm population in the United States is about the same as in 1910; the number of people in towns has increased.



ANCIENT ARMORED LIZARD

Well protected with rings of thick-scaled armor was this reptile of Oligocene time, 40 or 50 million years ago. It has been named *Glyptosaurus giganteus* by Charles W. Gilmore of the U. S. National Museum. Actual length of the specimen pictured here is about 14 inches: the whole animal must have really merited the specific name which Mr. Gilmore has bestowed upon it.



ATOMIC BIG BERTHA

An entirely new principle is involved in the operation of this "straightsway" atom-smashing apparatus at Cornell University.

PHYSICS

New Atom Smasher Uses Short Wave Radio Generator

AN ATOM smasher of new type, producing high speed particles at relatively low voltages with safety to the operator, promises a further understanding of the structure of the nuclei of the atoms and the forces holding them together. Completion of this new tool of science was announced recently at Cornell University.

It is an eight-foot glass tube, six inches in diameter, with a radio short wave generator providing an alternating potential which changes ten million times each second. Operating very much like the distributing system of an automobile where the spark plugs ignite each cylinder in rotation, the short wave generator of the new atom smasher alternately charges the segments of the tube through which the particles have to pass on their way to the target.

In contrast to the well-known cyclotron, which speeds up its atomic bullets in a merry-go-round motion, the new atomic gun accelerates the projectiles in a line. It is called a linear resonant accelerator by its designer, Dr. Lloyd P. Smith, professor of physics at Cornell. With Dr. Paul L. Hartman, of Reno, Nev., Prof. Smith has completed his machine at a cost of about \$7,000 and it is now in successful operation.

Advantages claimed for the new tool are: 1. Greater accessibility of the ion source and the target and absence of danger from electrical shock; 2. Ability to accelerate heavy atoms more successfully than the cyclotron; 3. The resonant property of the system serves to select out the atom desired as a bullet thereby saving the target from unnecessary bombardment; 4. A vacuum for the tube is produced by a simpler process and can provide a greater beam density of accelerated particles than the cyclotron.

An original voltage of 50,000 to 70,000 volts is stepped up to about a half million volts and the tube produces ions of higher intensity otherwise available only by use of voltages running into the millions.

Science News Letter, February 4, 1939

PHYSICS

Scientific Side of Skiing Studied by Physicists

SKIING has achieved wide recognition as a thrilling sport and as one of the most graceful of the kinetic arts. But there is more to it than that. It is a branch of applied physics, and as such it has received serious scientific attention.

Not, as might be imagined, in Norway, the land of its birth. The physicists who have devoted close and exact study to the physics of the wood-winged feet bear the utterly un-Norse names of Uki-tiro Nakaya, Motoiti Tada, Yataro Sekido and Tamakiti Takano. They are members of the faculty of science at The Hokkaido Imperial University, and they conducted their researches in the pearly powder-snow on the slopes of Mount Tokati on the northernmost of Nippon's principal islands.

First of all they studied the physics of the snow itself. Powder-snow, they found, forms from the tiny, starlike snow crystals by the double process of sublimation (evaporation without thawing) and re-deposition of the vapor as ice on the flat sides of the crystals. This converts them into rounder, denser pellets—something more nearly approaching the conditions of particles in a true powder.

They found also that even without partial thawing and refreezing, deep falls of snow have a layered or stratified structure, due probably to differences in rates of fall as influenced by changes in the wind. These obscure strata could be demonstrated by digging a wide hole in the snow and building a blazing fire at its bottom.

When a ski passes over a snow mass it causes a packing down of the snow directly beneath it. The degree and depth of packing can be studied by means of the stratifications just mentioned.

Above this packed zone, there is a depth of several inches of loose snow that is carried forward by the thrust of the sloping ski. The Japanese scientists were able to obtain graphic curves representing this zone of displaced snow by cutting a narrow slot in the snow with a pane of glass, filling this with a colored powder, charging over it on skis, and then cutting a vertical section along the ski-track to photograph and measure the curve.

Science News Letter, February 4, 1939

BOTANY

Two Monkeys Trained to Collect Treetop Flowers

TWO monkeys have been trained as assistant collectors of botanical specimens in high trees, by E. J. H. Corner, Acting Director of Gardens, Straits Settlements. The animals are of the species known locally as "berok." They understand twelve words of Kelantanese, a native language, and can thus be instructed to pick only the twigs which their owner, on the ground, directs them to take.

Science News Letter, February 4, 1939

ENGINEERING

Worm's-Eye and Angel's-Eye Views of New York in Exhibit

World's Largest Diorama, Showing 6,000 Buildings, Will Tell Story of Daily (and Nightly) Life in Metropolis

See Front Cover

VISITORS to New York during the 1939 World's Fair will have the unique privilege of getting a worm's-eye view and an angel's-eye view of the Big City's famous rush hour on one and the same day.

Out-of-towners unused to the mechanics of outwitting subway doors will have their revenge—an opportunity to look down and say, how puny this frenzy seems!

The world's largest diorama, a block-long, three-story-high reproduction of 4,000 buildings that contribute to the fabulous skyline, will show in 11 minutes life in New York around the clock. And its designers didn't forget the rush hour.

As 50,000 watts of power feeding "day-light" into the exhibit die out for the end of the day, the model will show New York motion in all its rush hour frenzy. Elevators in the buildings will rush up and down; trucks, buses and other vehicles will tear back and forth with greater facility than they do in real life; and subway trains will scurry underground, in cross-sectional tunnels clearly visible to the spectator. The sight will be soothing to the most outraged and trampled ego.

Complicated Wiring Job

Involving the most complicated job of electrical model wiring on record, the diorama is sponsored by the Consolidated Edison Company, New York's power merchants. It will be known as the "city of light." The 4,000 models of skyscrapers have 130,000 windows.

A model subway system, whose trains will travel the equivalent of one and a half times around the world during their meanderings in the diorama's bowels, will be a feature. Comprising 57 cars, the tiny trains will draw their power from a third rail and will have a block signal system similar to that used in actual subway operation. The cars are of cast aluminum.

The exhibit was designed by Walter Dorwin Teague. So detailed is it that even the jewelled lights of Coney Island

will be shown in the Brooklyn corner of the diorama after nightfall.

During one brief interval in the cycle, seven small circular dioramas within the large one will come into view, showing various phases of city life, including a night baseball game, an operation at the Medical Center and a ballet in the Radio City Music Hall. During another interval, a display showing the tangled maze of electrical wiring, steam, gas and sewer piping that underlies the city will be lighted.

The model buildings are constructed of prefabricated composition slabs, superposed on wooden frames. A steel frame supports the entire structure.

Science News Letter, February 4, 1939

VOLCANOLOGY

Cooling of Rocks Cause of Volcanoes

MANY volcanoes erupt not so much because the molten rocks underneath the earth are still hot but because those rocks are cooling and in cooling they build up greater and greater steam pressures.

To a fireman tending a steam boiler, or to millions of good fathers who tend the family heating plants, this statement may seem puzzling. For they know that higher pressures are built up when a boiler becomes hotter. As it cools the steam pressure falls. And so it is in normal, everyday experience.

Volcanoes, fortunately, are not everyday occurrences on earth. Cooling does produce the great pressure increases which bring forth eruption. Huge quantities of steam liberated by volcanoes are just a way of relieving excessive pressure.

Studies at the Geophysical Laboratory of the Carnegie Institution of Washington have shown that the presence of water, contained in the molten rock, is the key to the seeming paradox.

This water frequently is held in solution by the silicates present. As the molten rock cools some of the silicate minerals are frozen out. The water is left behind but with smaller quantities of silicates present to hold it in solution.

Because of the relatively increased water content the steam pressure exerted by the dissolved water increases even though the rock mass may be cooling. Enormous pressures, built up in this way, are equalized in volcanic eruptions.

These studies, carried out by Dr. G. W. Morey and his co-workers and by Dr. Roy W. Goranson of the Geophysical Laboratory, involve the behavior of water in silicate melts under extreme high pressure in conditions which rival those found far beneath the surface of the earth.

Science News Letter, February 4, 1939

ENGINEERING

Air-Conditioning Attacks Self-Created Problems

WITH AIR conditioning coming into widespread use in larger, public buildings, the heating and ventilating engineers, who have made this advance in human comfort possible, are now faced with some serious problems which they have thus created.

As one example, what health risks are there involved in the recirculation of cool air through a crowded motion picture theatre, restaurant, or office building? It is hardly economical to use the cooled air only once and take in completely fresh air at each cycle in the air flow. Thus only a fractional part of fresh air is taken in.

Since this situation exists, the question arises whether the bacterial content of the air in an air-conditioned building gradually rises. If it does, does it approach a bacterial concentration which is potentially menacing to health?

In hospitals, too, there is the problem of what to do about the ventilation of contagious disease wards from which the air passes into a common system and, potentially, may be recirculated through the whole air-conditioned hospital.

More widely known among laymen is the problem of ridding restaurants and railroad cars of the odor of smoke. Here the problem is complex because it not only involves the cleaning of the air and its recirculation but the removal of elusive odor also.

The research committee of the American Society of Heating and Ventilating Engineers is considering these and other problems. These engineers are formulating experimental projects which will seek the best solution.

The task, they well realize, will be slow, for the problems involve medicine, biology, chemistry and physics as well as engineering.

Science News Letter, February 4, 1939

ETHNOLOGY

Pity the Poor Pharaohs!

Egypt's Ancient Sky Religion Called for Seven-Year Reign; If Pharaoh Wasn't Dead Then He Had to Commit Suicide

By EMILY C. DAVIS

HAVE YOU ever felt sorry for the haughty, glamorous Pharaohs of history?

Ten to one, you never have.

Yet, an Egyptologist now advances the theory that young Tutankhamun and many other Egyptian kings were caught personally in a pitiable trap. Theirs was the same prospect faced by dashing Francois Villon in the romance "If I Were King."

You recall in that story, Villon was made king of France for a day, and cruelly told he must die at the end of it. But long before medieval France, kings of Egypt were actually living out such dramatic episodes, knowing all too well when they took the throne that they might expect to die at a set time. Usually, Pharaoh was allowed seven years to live—a little better than the day offered poet-adventurer Villon, but nothing to make a Pharaoh light-hearted.

Seven Years—and Then!

Seven, perhaps nine, years of glory—and then—!

This theory, that Egypt's rulers were pitiful victims of an ancient sky-religion to which Egypt tenaciously clung, is advanced by G. A. Wainwright, former inspector-in-chief of Egypt's Antiquities Department.

Mr. Wainwright has been reading between the lines in Egyptian history, religion, and legends. What he has found puts an entirely different light on the Pharaohs, and on many a curious turn in Egypt's history.

On the surface, you see the Pharaoh as a glittering, enviable figure. Everybody is bowing and scurrying to carry out his whims. He lives magnificently in a luxurious palace. The Nile country is plastered with monuments telling how colossal he is. Millions of people are at his command, to fight his battles or build him a tomb.

All Egypt seems to exist merely to glorify this star—the Pharaoh. But under the surface, there may be personal tragedy.

It goes back, the Egyptologist explains, to beliefs that people in North

Africa held long before Egypt became a civilized land. To understand it, you have to think of primitive tribes searching the sky for rain. When the rain fell there was a good crop and plenty of wild game, and everyone could eat and be comfortable. But when rains held off there was starvation and misery.

So in Libya, North Africa, as in many other parts of the world, human beings worried over their dependence on rain. They not only talked about the weather. They tried desperately to do something about it.

Magicians Made Rain

There arose, then, magicians with sky powers, who in time developed into priest-kings. Rain could be brought down, it was believed, by knowing the proper rites and words, and by personal sanctification.

Being the cleverer men of a group, magicians often made good. Success was partly a matter of learning what they could about weather signs—so as to choose likely times for rain-making rites. But if rain failed, the rain-maker was quick to announce that sky-gods were angry with the people's sacrifices or behavior.

Out of such primitive reasoning and faith came Egypt's early sky-religion. Important among the early sky gods was Seth, god of rain and storm, a god to whom the pig and the hippopotamus were sacred. Also, there was Min, an old, old god of fertility, who evolved into Egypt's super-powerful god Amun.

Egypt's kings were close to such gods as these, and supposedly even had divine powers as representatives of the gods on earth. Reduced to practical terms, this meant Pharaoh was charged with Egypt's weather control and health insurance.

In Egypt, to be sure, climate had changed so that rain was no longer the prime need. Rather, Egyptian farmers worried about the Nile. The annual flood of the Nile must be exactly right in quantity to irrigate the fields. It became Pharaoh's business to control the Nile.

Hence, when you read the fantastic string of powers and titles attached to an Egyptian king's name, don't think

too scornfully that this was all silly vanity. Some of these titles, like "Lord of the Sky, Lord of the Earth, Leader who directeth the two Banks of the Nile, Lord of Destiny, creating the plenteous harvest," and so on, were the unfortunate man's royal duties. They were set down with precise and terrible realism.

The phrases Lord of the Sky, and others just mentioned, were among those addressed to Ramesses the Second by courtiers on one occasion. Ramesses is one of the Pharaohs who ruled along about the time when the Children of Israel were in bondage in Egypt. Whether it was he, or another Pharaoh before whom Moses and Aaron stood when they demanded that Pharaoh let the children of Israel go, the man on Egypt's throne must have been in an embarrassing spot. He was supposedly god-like in his control of nature. Everybody said so. Yet the Israelite leaders challenged his powers and called down plagues on Egypt in the name of their own god, Jehovah.

Ordinarily, of course, no one checked up on Pharaoh's efficiency as a weather control agency, or as guardian of national life and health. Pharaoh was above that, being divine.

Deadly Last Duty

But being god-like was precisely Pharaoh's dilemma. For, according to the ancient religious reasoning, it was supposed by the masses that the divine ruler could pass on full god-like power to his successor only if he laid down his life in its prime. Pharaoh's last duty was to slay himself or be slain.

Mr. Wainwright explains that this sacrifice has been required of king-priests in many lands and eras. There are tribes in Uganda, Africa, that require the ruler to commit suicide. In ancient Italy at Nemi the divine priest had to be slain by his successor, a runaway slave. In ancient Prussia the divine king used to light his own funeral pyre.

Egypt's traditional ending for a Pharaoh was by fire.

There are classical tales in Egypt about kings who died in this way. And Mr. Wainwright says they are not fairy-tale nonsense. They record "details of the Old Religion and the horrors enacted under it."

King Mycerinus, who lived in the pyramid building age near 3000 B. C., was one Pharaoh who ruled seven years and then—reluctantly—accepted the order to die. Mycerinus complained, so later historians averred, because he had to die early although he was very religious and permitted sacrifices in the old manner. It seemed unfair to him, considering that the great pyramid-building Pharaohs Cheops and Chephren had with hardboiled determination refused to let the people sacrifice, and had included themselves firmly in the “no sacrifice” decrees. They lived to good old ages, both of them. But Mycerinus died.

Women Pharaohs, as well as men, died for their country. Even beauty did not save them.

Lovely But Doomed

There is a story which may have elements of truth in it about divine, golden-haired, red-cheeked Nitocris who was set on the throne when Egyptians slew the reigning Pharaoh, her brother. This blonde Pharaoh, with a high sense of royal duty, brought her people victory, drowned her brother's murderers, and at the end of seven years “cast herself into a room full of ashes.”

After the pyramid age, during which Mycerinus and Nitocris reputedly were slain, Pharaohs were usually successful in evading or escaping this divine fate, judging by clues in the records.

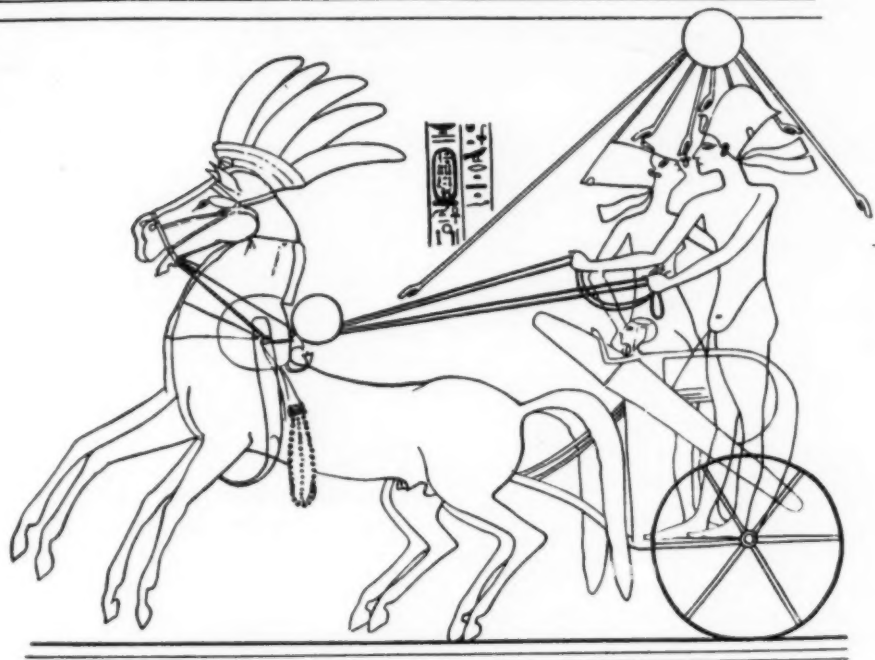
There were various ways for a Pharaoh to outwit death. He might, for instance, be bold enough to say he could renew his youth by magic. Ramesses the Second got away with this.

Or, a Pharaoh might convince his people that sacrificing a substitute, either man or animal, was “just as good.” Or, he might enact the rite in a play, and survive.

Some Pharaohs, who were lucky, escaped untimely deaths because they lived in eras when the Old Religion was not so popular as later religions, such as worship of the sun-god Re.

A good many Pharaohs escaped death by making the sun-god's religion official. This was clever strategy, since the sun cult had no sinister seven-year plan, climaxed by slaying a king.

Mr. Wainwright suspects that what we know about Egypt's religions has been considerably distorted by this fact that so many Pharaohs gave prominence to the religion of the sun. As the religion under royal patronage, worship of Re got wide publicity on monuments and inscriptions. The older and more



HE DIDN'T WANT TO DIE

Pharaoh Akhenaten, father-in-law of Tutankhamun, with a prosperous kingdom, a beautiful wife and children to whom he was devoted, had every reason for wanting to live beyond the seven years conventionally allowed an Egyptian ruler by the old sky religion. This may have had something to do with his zeal in propagating his monotheistic reform.

fundamental religion might continue to hold the people, but its strength was not proclaimed in enduring stone.

Tutankhamun's father-in-law, the Pharaoh Akhenaten, made a tremendous effort to wipe out the old gods of Egypt, and to replace them with the worship of one god, the sun disk. Akhenaten has been much praised as an idealist who caught a wonderful vision of the worship of one god. Mr. Wainwright's theory introduces a different motive for Akhenaten's religious revolution. Akhenaten may have been a desperately frightened man.

When he closed the old gods' temples, and moved his entire capital to a brand-new city, Akhenaten was, perhaps, making a fight for life. When he wreaked special vengeance on the images of one priest of the old gods, there was doubtless a reason. Mr. Wainwright suspects that the reason was this: the priest was the one who would have sent Akhenaten the official order to die.

“As with Cheops' and Chephren's, Akhenaten's revolt was shortlived,” he says, “and the rebels were soon brought back to a sense of duty.”

After Akhenaten, young Tut came to the throne. The powers behind the throne forced the young man to change

his name from Tut-ankh-Aton, which meant “the life of the sun's disk is pleasing,” to Tut-ankh-Amun, “the life of Amun is pleasing.” Pharaoh Tutankhamun had to return to Thebes, where the old god Amun was supreme. And there young King Tut died and was buried—after a nine-year reign, or seven years after he accepted the god Amun.

“All this,” the Egyptologist reasons, “is extraordinarily suggestive of his having to accept the age-old doom of the divine kings of the sky-fertility-religions the world over, and having to render up his life for the good of his people.”

Tutankhamun did at least escape death by fire. Many Pharaohs seem to have fought for that point and won.

As late as 712 B. C., though, an Egyptian Pharaoh died in the flames. This happened to Pharaoh Bocchoris, who reigned at a time when Libyans had seized Egypt's throne. Libya was the original homeland of the old sky-religion. Naturally enough, the Libyans re-enforced their time-tried ceremonies. Bocchoris ruled seven years. And it was his successor who instigated his death. Doubtless, a good many kings were maneuvered into destruction by ambitious heirs to the throne, who believed they themselves could out- (Turn to Page 74)

MEDICINE

**New Medical Journal
For Mind and Body**

A NEW medical journal is about to appear with the objective of bringing together medical knowledge relating to both mind and body. The new quarterly is titled *Psychosomatic Medicine*.

The first issue will have a leading article on "Psychological Aspects of Medicine" by Dr. Franz Alexander, Chicago psychoanalyst, and groups of articles on the hypothalamus gland and hypertension or high blood pressure.

Dr. Flanders Dunbar, practicing psychiatrist of New York, will edit the new journal, which is sponsored by the National Research Council's Committee on Problems of Neurotic Behavior, headed by Dr. Walter R. Miles, professor of psychology at Yale University.

Science News Letter, February 4, 1939

MEDICINE

**What Happens After
TB Patient is Cured?**

WHAT happens to the patient who has had tuberculosis after he has been cured? Unless you know someone who has been in this position, you probably have never considered the problem. But it is a major problem, and one which concerns the public far more than is generally realized.

In order to determine the size of the problem and how best to attack it, the National Tuberculosis Association is tracing the many thousands of patients who left tuberculosis sanatoria throughout the country in 1933.

The facts are not yet all gathered, but it has already been learned that almost half the patients discharged in that year have since died from a recurrence of tuberculosis. Most of these deaths occurred within the first two years after discharge. About one-fourth of the patients are found to be working and self-supporting.

Discussing the problem at a tuberculosis conference in Philadelphia, Dr. Kendall Emerson, managing director of the National Tuberculosis Association, pointed out, among other things, how this problem of after-care in tuberculosis affects the public. On the one hand there is the tremendous economic burden of supporting the patients after they have left the sanatoria, if they are not in shape to support themselves. On the other hand, there is the fact that if the patient gets sick again he may again spread the disease to others. When tuberculosis has been arrested, the patient is not infec-

tious. When the disease recurs he is again infectious.

Treating tuberculosis and preventing new cases from arising are important measures in the fight against tuberculosis. But it may well be questioned what good it does to save lives unless those saved are enabled to live their lives in a happy, normal way.

Rehabilitating the tuberculosis patient should be started, Dr. Emerson pointed out, long before the patient is discharged from the sanatorium. Best results are obtained with those patients who were least seriously ill—the minimal cases.

Science News Letter, February 4, 1939

TEXTILES

**Bacteria Destroy New
Synthetic Wool Cloth**

THE MAKING of synthetic wool-like fibers from the casein of milk is a truly amazing development of modern chemistry. When such fibers are blended with natural wool, beautiful and serviceable fabrics are obtained.

But milk is quickly acted upon by bacteria, and scientists have been wondering if the synthetic fibers too might be susceptible to attack by micro-organisms.

Two Dutch scientists have investigated these "wool-from-milk" fibers and have found that bacteria, which ordinarily are able to destroy proteins of the casein class, succeed in completely dissolving the synthetic fibers. In a fabric made entirely of the synthetic fibers the destruction was complete. In a mixture of 50 per cent. synthetic wool and 50 per cent. genuine wool only the synthetic wool was destroyed.

Jan Smit, lecturer in microbiology at the University of Amsterdam, and his colleague B. van der Heide, of Wageningen have reported on their experiments proving these findings.

"It was found," they state, "that nearly all casein-splitting micro-organisms, isolated from soil or manure, or gathered by infection from ordinary atmosphere, are able to attack the (synthetic) wool."

The action of the organisms appears to be by means of an enzyme, i.e. by liberating a chemical that attacks the synthetic wool.

Heating the fibers and bacteria to the temperature of boiling water appears to destroy the enzyme reaction so that one might speculate whether wearers of such synthetic wool clothing would have to boil their suits periodically.

Science News Letter, February 4, 1939

IN SCIENCE

ARCHAEOLOGY

**Germans Work to Uncover
Stadium At Olympia**

REMOVING the earth blanket from the most famous athletic field in the world is a goal of German archaeologists now working at Olympia, Greece.

When modern Olympic games at Berlin in 1936 inspired Herr Hitler to renew German digging at the original scene of Olympics, German archaeologists cast about to think what they could dig for.

Germans had excavated Olympia sixty years ago, with enough thoroughness to give the world a good idea of the place. The walled-in sacred grove, the religious heart of Greek Olympia, was completely uncovered and its ruined temples, altars and pedestals were revealed. Olympia's famous statues of gods and heroes proved the chief disappointment. Few statues could be found either within the sacred area or outside of it—for the excavators spread their investigations to important buildings around the temple area, digging at times through nearly 20 feet of earth to reach the ruins. They worked six seasons, spent \$200,000. The report required five volumes.

Still, Olympia is yielding pay dirt to the present expedition. Foundations of an impressively large portico that bordered the sacred area at south and east, have been entirely uncovered, and a quantity of Doric architectural fragments have been found and replaced.

Bronze objects, some showing offerings made in early centuries of Olympic games, have been found.

As for the stadium east of the temples, the job there is to dig out 75,000 one-ton truck loads of mud and soil that river floods have spread over it. The earlier expedition found the start and finish points, proving that Greek athletes ran a straight course here, 210 yards. Spectators sat on embankments, no seats being provided. The present expedition, now in its second season, has trenched through the covering earth to virgin soil, finding that the ancient stadium went through five stages of improvements and renovations from the sixth century B.C. to the Roman era.

Science News Letter, February 4, 1939

SCIENCE FIELDS

PSYCHOLOGY

Left-Right Argument Is Affecting Higher Education

AN IDEA can kill. This seems strange for we are inclined to think of ideas as peculiarly personal and intimate affairs. We think of philosophers as remote from the activities of the workaday world.

Yet Europe is inflamed because of ideas—you may call them ideologies if you will. In America, where speech is still free to almost all, these same ideas are the subject of heated controversy and Congressional investigation. They have influence in many spheres of daily life.

Effects of the philosophies of leftist groups and rightist groups on American higher education were noted by Dr. Leonard Carmichael, psychologist, in his inaugural address as president of Tufts College.

The left wing, Dr. Carmichael pointed out, would make of education an instrument of social indoctrination. The right wing would return to the spirit of the classics and make of education a discipline for exercise on mental chest weights.

Both extremes have in common an opposition to recent American trends toward recognition of individual differences in a free elective system. They would both cut the educational pattern to fit their respective philosophies instead of allowing philosophies to develop as a natural result of education and scientific advance.

In America, where are more psychologists than in all the rest of the world, higher education has been adapted to conform with the findings about the human mind.

Psychological studies have shown that "the mind" does not gain in strength with mental gymnastics, but that intellectual power does result from training in techniques of scientific thinking.

Progress in measurement of the mind has disclosed the vast importance of individual differences. The new science of mental hygiene has brought attention to the importance of individual happiness and satisfactory adjustment to the world in which we live.

Such discoveries should be reflected

in a democratic individualistic educational system in which each person is fitted for life in our society and also prepared for life in a constantly changing social order.

Science News Letter, February 4, 1939

PHYSIOLOGY

14,000,000 Kinds Of Gland Activity Possible

OVER 14,000,000 combinations of glandular activity may occur in your body. This astounding figure was reached through mathematical calculations by Dr. R. G. Hoskins of the Memorial Foundation for Neuro-Endocrine Research at Harvard Medical School.

The actual figure of possible combinations is 14,348,907. Not all of these represent diseases, though many of them do.

The combinations refer only to activity of the glands of internal secretion, called the endocrine glands. These are the ones that manufacture chemicals, called hormones, which influence growth, sex and many other body activities.

There are thirteen of these glands: pituitary and pineal in the head; thyroid and four parathyroids in the neck; thymus in the chest; two adrenal glands above the kidneys; the Islands of Langerhans in the pancreas; and two sex glands. At a conservative estimate, these glands produce at least fifteen different hormones. One part of the pituitary gland alone produces six hormones.

For each hormone there is the possibility of a normal amount being produced and also of less than normal or more than normal quantities being produced. This gives three conditions for one hormone alone. But a striking thing about glands and hormones is that they are not individualists. They act together, either reinforcing each other, or substituting for each other, or interfering with each other. You can get diabetes, for example, because of something gone wrong in your pituitary gland as well as by the more usual situation of something being wrong with the Islands of Langerhans in your pancreas.

All this makes trouble for the doctor trying to find out why you are sick. If one gland is concerned there are only three possibilities. If two are concerned, there are not six but nine possible combinations of gland activity. With three glands or hormones to consider, the permutations rise to 27. For the fifteen hormones, the number of permutations rises to 3^{15} or 14,348,907.

Science News Letter, February 4, 1939

MATHEMATICS

Danger of Death by Bomb Expressed Mathematically

YOUR chances of being killed by a high-explosive bomb dropped from an airplane can be calculated mathematically—if that's any consolation to you. Prof. J. B. S. Haldane, biologist of University College, London, does it.

The factors involved in Prof. Haldane's formula include the number of bombs expected to drop on your town and the probability of one falling close enough to blow down the house or shelter you are in, and involves the use of the calculus.

The policy of evacuation of cities, adopted in Britain and France during the recent crisis, is intended to reduce the likelihood of a hit in one's personal danger zone, though it may increase the likelihood of demolition of one's shelter, "as when a child is evacuated from a fairly solid house into a flimsy hut," the British scientist points out.

The policy of dispersal within a dangerous area does not reduce either danger, he continues. "It merely ensures that no single bomb will kill a large number of people, while increasing the probability that any given bomb will kill at least one. It is likely to save a few lives by equalizing the numbers of wounded to be treated in different hospitals; and the psychological effect of having 20 killed in each of 10 areas may perhaps be less than that of 200 killed in one area."

Science News Letter, February 4, 1939

ECONOMIC ENTOMOLOGY

Sweetcorn Protected by Two New Chemical Methods

CORN-on-the-cob need not have worms in it any more. Two ways of keeping corn earworms out are described in the annual report of the Bureau of Entomology and Plant Quarantine.

One attack on the earworm's citadel consists in shoving a small tablet of hexachloroethane into the tip of the ear and fastening it in place with a paper clip. The chemical gives off fumes which do not harm the corn grains but are most discouraging to the worms.

The second method is even simpler. The gardener merely goes around with an oilcan full of light, highly refined mineral oil, squirting a few drops on the cornsilk. The oil penetrates the whole mass of silk, smothering the small worms and driving out the larger ones.

Science News Letter, February 4, 1939

From Page 71

wit a similar fate. At any rate, Bocchoris died, and Mr. Wainwright calls the scene "the culminating horror of the Old Religion."

There are people alive in Egypt today who can remember seeing a play-acted form of Egypt's ancient, once tragic rite. For in small towns of Upper Egypt as recently as sixty years ago, the Coptic New Year was celebrat-

ed by having a villager in costume act as a mock king, Abu Nerez, father of the New Year. After three days of carnival, the dress of the mock-king was burned and from the ashes emerged a peasant farmer. And this, Mr. Wainwright concludes, was the last burlesqued remnant of Egypt's royal sacrifices.

This article was edited from manuscript prepared by Science Service for use in illustrated newspaper magazines. Copyright, 1939 by Every Week Magazine and Science Service.

Science News Letter, February 4, 1939

ENGINEERING

Degree of Air Pollution Shown in Survey of Cities

Home Fires Among Greatest Offenders, Especially In Regions Where Coal Has High Sulfur Content

RESULTS of a fifteen-month survey of sulfur gases in the air in great metropolitan centers show that St. Louis is the worst American offender, according to the report of the Air Hygiene Foundation and the Mellon Institute, (*Science*, Jan. 20.)

In figures indicating the parts of sulfur dioxide per million parts of air, five metropolitan areas rate as follows:

	Average
St. Louis-East St. Louis128
Pittsburgh057
Detroit028
Philadelphia-Camden027
Washington009

The above figures have, however, no significance from a public health standpoint, according to hygienists connected with the investigation.

Over 50,000 separate air tests were made by six chemists travelling in a special fleet of laboratory cars, states John F. McMahon, executive secretary of the Foundation. These chemists canvassed industrial centers of the East, South and Midwest and made tests covering all hours of day and night and all seasons of the year.

Home fires, the survey showed, are among the greatest contributors to air pollution, particularly in districts burning coal of a high sulfur content. The home fuel factor explains why the sulfur pollution was about 50 per cent higher during the winter heating season than in summer.

A close relationship was found between wind velocity and sulfur dioxide in the

air. The higher the wind, the cleaner the air. Fogs catch and store up sulfur fumes, Mr. McMahon reports. Some of the highest concentrations were obtained on foggy nights.

Occasional tests were made in a score of other cities during the test but the results, the report warns, cannot be compared with those obtained in the more extensive studies. In these occasional tests Chicago showed a sulfur dioxide contamination of .067 parts per million; Wheeling, W. Va., showed .070; and Cleveland .064.

Science News Letter, February 4, 1939

POPULATION

Fathers Gain Attention From Population Experts

FATHERS are usually ignored by statisticians calculating the future of the population just as the groom at a wedding is ignored by the society reporter.

The hope of a nation for perpetuating itself is usually figured on the basis of the rate at which mothers are succeeded by child-bearing daughters, the "net reproduction rate." This rate in recent years has been very low in Europe and America so that statisticians foresee a future in which the population no longer grows.

But fathers have their importance in these calculations, also. When it is desired to take account of the difference in reproduction rate between occupations or economic classes, then maternal reproduction rate is not enough, because no census gives details about the ages

of wives according to the occupations of their husbands.

The rate at which fathers are succeeded by sons of paternal age has been figured for Sweden and for England and Wales by Dr. Christopher Tietze, population expert. It is higher than the replacement rate of mothers for three reasons. The time separating father from son is greater than the length of a generation for women, husbands being usually a few years older than their wives. New-born boys outnumber new-born girls. And war losses and male emigration brought a feminine surplus to many European nations.

In Sweden, mothers produce only 69 per cent of the number of daughters required to replace them. Fathers produce 78 per cent of enough sons to take their places.

As far back as 1911, England's upper and middle classes, her lawyers, physicians, teachers, and clergymen were failing to replace themselves with sons. Paternity rates were highest for skilled workmen and miners. Textile workers, like the wealthy, had a paternity rate too low for eventual survival.

Why the difference between miners and textile workers? Dr. Tietze explains that the wives of miners are comparatively isolated. The wives of textile workers, often themselves employed, get out and talk with other women.

Science News Letter, February 4, 1939

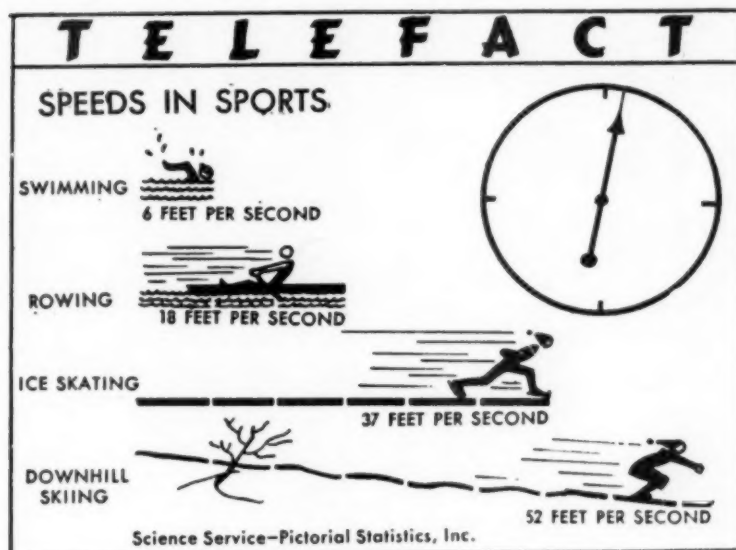
Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association resulted in the location of the following provisional epicenter:

Tuesday, January 24, 10:32.3 p.m., E.S.T.
Slightly inland near the coast of Chile. Latitude 37 degrees south, longitude 72.5 degrees west.

Stations cooperating with Science Service in reporting earthquakes recorded on their seismographs are:

University of Alaska, College, Alaska; Apia Observatory, Apia, Western Samoa; University of California, Berkeley, Calif.; Des Moines Observatory, Des Moines, Iowa; Dominion Observatory, Ottawa; Dominion Meteorological Observatory, Victoria, B. C.; The Franklin Institute, Philadelphia; Harvard University Observatory, Harvard, Mass.; University of Hawaii, Honolulu; Hong Kong Observatory, Hong Kong, China; Magnetic Observatory of the Carnegie Institution of Washington, Huancayo, Peru; Massachusetts Institute of Technology, East Machias, Maine; University of Michigan, Ann Arbor, Mich.; Montana School of Mines, Butte, Mont.; Montana State College, Bozeman, Mont.; Pennsylvania State College, State College, Pa.; Phu Lien Observatory, near Hanoi, French Indo-China; Seismological Observatory, Pasadena, Calif.; University of South Carolina, Columbia, S. C.; University of Vermont, Burlington, Vt.; U. S. Weather Bureau, University of Chicago; University of Wisconsin, Madison, Wis.; Zikawei Observatory, near Shanghai, China; observatories of the Jesuit Seismological Association at Canisius College, Buffalo, N. Y.; Fordham University, New York City; Georgetown University, Washington, D. C.; St. Louis University, St. Louis; St. Xavier College, Cincinnati, and Weston College, Weston, Mass.; observatories of the U. S. Coast and Geodetic Survey at San Juan, P. R., Sitka, Alaska, Tucson, Ariz., and Ukiah, Calif.



ENGINEERING

Manufacture of Cold Now One of Major Industries

REMEMBER the ice man? In the pre-war variety he is nearly extinct, but refrigeration is a booming industry these days because of the expanding use of cold-making in food and beverage preservation, air conditioning, and industry. Refrigeration has become one of our complex mechanical industries.

A refrigerating engineer may be called upon to provide anything from ice cubes for a cocktail party to a snowstorm for a movie production. While the electrical or gas household refrigerator, making in your own home its own low temperature, has largely outmoded the ice box, the major task of refrigerating experts may include not ice and low temperature production, but anything that helps preserve foodstuffs or manufacture weather.

At the recent meeting of the American Society of Refrigerating Engineers in New York, American pear growers were advised to adopt British method of adjusting the atmosphere in cold storage warehouses that allows Bartlett pears to be kept some 6 months instead of a few weeks. Confirming research at Cornell University shows that the trick is to adjust the carbon dioxide given off by the fruit itself to just the right amount.

Ultraviolet lights are finding their way into cold storage plants and packing houses to kill molds and bacteria that

otherwise, even with refrigeration, might spoil the food being stored.

Mass attacks upon bacteria must be used to be effective because it requires 1,250,000,000 average size bacteria to cover an area of one square inch.

One of the most modern methods of food preservation is quick freezing. Extreme chill catches the food before it has a chance to know what has happened to it and keeps it fresh for months.

In the research laboratory low temperatures are useful in testing the way automobiles, materials, oils, engines and other useful things will react under strenuous frigid conditions.

The cold industry has come a long way since the days when our grandfathers cut pond ice in winter and stored it in sawdust against the summer's heat.

Science News Letter, February 4, 1939

PSYCHOLOGY

Colored Hearing Is Rare But Music Suggests Color

COLOR as a background of music will increase in public favor in the future, is the prediction of Dr. Carl E. Seashore of the University of Iowa.

For many persons a close association exists between color and music, but this is not necessarily because they actually

have what psychologists know as "colored hearing."

Some few persons invariably do see a color when they hear a particular tone. But Dr. Seashore estimates that not one per cent of the population have this true colored hearing. It is usually associated, he says, with high-strung temperament and sometimes with hysteria.

"Try this experiment," Dr. Seashore writes in the *Music Educators Journal*. "Close your eyes, cover them with your hands, and then observe what a gorgeous display of color in action you see. This is the stuff that dreams are made of because these colors are most prominent in the dark. . . . The phenomenon is present every moment in our life and it modifies the actual colors of objects that we see."

If you are able to see these colors freely and you happen to be listening to music, you might erroneously credit the colors to the sound. This is not true colored hearing but entoptic phenomena.

Some music immediately suggests to the listener a scene and this scene is likely to appear in full color. If a musical phrase suggests moonlight, for example, the listener will "see" the moonlight. This is visual imagery.

Still another way in which music makes us see colors is through association by analogy. Music displaying excitement may make you think of murder or battle and hence red. A pastoral type of music might make you think of green fields.

"There is no foundation for the often claimed theory that there is a physical relationship in vibration frequency for sound and for color which can be utilized," Dr. Seashore says. "Nor is there any constant tendency wherein two individuals associate the same color with a given tone or phrase for any considerable time."

Science News Letter, February 4, 1939

Don't Delay

getting that new book you want to read. SCIENCE NEWS LETTER will gladly obtain for you any American book or magazine in print. Send check or money order covering regular retail price (\$5 if price is unknown, change to be returned) and we will pay postage in the United States. When publications are free, send 10c for handling. Address:

Book Department

SCIENCE NEWS LETTER

2101 Constitution Ave. Washington, D. C.

POPULATION

Study of Attitudes Shows Why Families Are Small

POPULATION problems, so intimately associated with the political difficulties faced by the world today, seem an ideal field for close cooperation between many sciences.

At first glance, the problem of falling birth rates would seem one for biologists to struggle with. Yet since the days of Malthus the matter of population has been recognized as food for the best thought of economists.

A recent study conducted at Columbia University by Dr. John C. Flanagan demonstrates how much the psychologist can contribute toward eventual solutions.

Neither the crowding of certain regions with excess births nor the declining trends in reproduction elsewhere are giving the greatest concern today. Rather it is the fact that, especially in the United States and Europe, the best part of the population in intellectual ability, economic talents, and physical health are losing out numerically while the less desirable biologically are gradually peopling the nations.

About 300 professional men and their wives were examined by Dr. Flanagan

to discover facts about their personalities, attitudes, interests, ideas of values, and ideals that might provide a clue to what causes this unhappy situation.

One-child families are not considered ideal by this group. Like most other people they would like to have three or more children.

Financial factors lead among the reasons causing them to limit their families to a smaller number. And most important among the financial considerations is the cost of higher education.

It is for the psychologist to discover why couples in a much poorer situation financially should be bothered so much less by these considerations when planning the size of their families.

Other matters important to professional men and their wives are the cost of adequate insurance, housing and child care, and the health of the wife.

The theory that the decline of the birth rate in the United States is due to decadence and loss of virility in the human stock of the nation is refuted by other evidence gathered in Dr. Flanagan's study.

Science News Letter, February 4, 1939

MATHEMATICS

Probability, Chance To You, Plays Role in Daily Life

WHETHER we admit it or not, our lives are surrounded by what the mathematician called "probability". Or more simply "chance". And that does not mean betting on the horses or playing the numbers game, although probability enters into these activities in a more predictable way than many of the other things that we do.

The theory of probability is an important sector of both mathematics and philosophy. Scientists will be interested in a survey recently published in the International Encyclopedia of Unified Science (*Principles of the Theory of Probability*, by Ernest Nagel).

One comforting thing is that scientists themselves know that the last word about probability or chance has not been said. That is important to realize these days

when an unsettled situation or controversy in science is likely to be seized upon by dogmatists hostile to freedom of intellectual inquiry.

The daily affairs of men are carried on, Dr. Nagel declared, "within a framework of steady habits and confident beliefs, on the one hand, and of unpredictable strokes of fortune and precarious judgments, on the other."

"Our lives are not filled with constant surprises, and not all our beliefs are betrayed by the course of events; nevertheless, when we examine the grounds even of our most considered actions and beliefs, we do not usually find conclusive evidence for their correctness."

"We undertake commercial or scientific projects, although we do not know whether illness or death will prevent us

from completing them; we plan tomorrow's holiday, although we are uncertain what weather tomorrow will bring; we estimate our budget for next year, although we are not sure whether the consequences of floods, droughts, or wars will not seriously throw it out of balance."

"In spite of such uncertainties, we manage to order our lives with some measure of satisfaction; and we learn, though not always easily, that, even when the grounds for our beliefs are not conclusive, some beliefs can be better grounded than others."

Science News Letter, February 4, 1939

PHYSICS

"Piped Light" New Tool For the Operating Room

"PIPED light" that starts out of a bulb in a convenient location and travels along inside a transparent "pipe" is the newest tool the doctor has in his war on infirmity and disease.

Surgical instruments, with a bulb in their base, that can carry the light to the point inside the human body where it is wanted, are now being made from the new "piping" material, a transparent plastic known as lucite, E. I. du Pont de Nemours and Company have announced.

A tongue depressor made of the new material has a light in its base outside the patient's mouth; yet the light comes out at the end of the depressor, far back in the mouth where the doctor wants it most. Furthermore, the light is cold, so that the patient feels no discomfort from heat.

A possible major application of the new "piped light" is to the tough problem of providing enough illumination for surgery deep in the abdomen or in the brain. Enormously powerful lamps are now used, but they have two serious drawbacks: the generation of terrific heat and glare.

Use of jointed pipe for the light would put the lamps away from the otherwise sweating doctors and would produce a light they could put below eye level, one of the essential steps in eliminating glare. Or they could insert probe "light pipes" inside the incision to provide illumination right where it is needed.

The principle upon which they operate is that of internal reflection. A number of materials, including quartz, have the property of reflecting light within its walls so long as the surface is not broken as in cutting or grinding. The

HISTORY OF SCIENCE

Ancient Rome Ruled Out As Benefactor of Science

Borrowed Ideas and Techniques Freely, But Were Not Originators, Declares New York University Scientist

ARE WE deeply indebted to ancient Rome, in the line of science?

No, declares Dr. William Salant, guest professor at New York University Medical College.

Dr. Salant has looked into the Roman record for scientific achievement, and has questioned the verdict of those who regard ancient Rome as one of the world's centers of scientific progress.

His view, argued in the *Scientific Monthly*, is that science has its roots in society, but the state of society was unfavorable to science both in Roman Republic and Empire.

The Romans carried totalitarian government to an extreme that wiped out individual freedom, left no incentive to those who might have spent years developing a new principle or process. Rome scorned pure science. War and practical matters were occupations for a Roman.

And, since military conquest brought in thousands of captives, there was plenty of cheap labor—hence no need to worry over technological improvements.

So little were the Romans science-minded, that Dr. Salant declares, "when surveying beyond the simplest type was needed, Greeks had to be employed."

Romans borrowed glass-blowing techniques from Egypt and Phoenicia. They got architectural ideas from Etruscans, and craft and art notions from the Greeks. But, unlike the Greeks, who would have been stimulated by these foreign innovations, the Romans were not inspired. They lacked originality,

says Dr. Salant, dismissing Rome's inventions as unimportant.

Rounding up a verdict on various sciences, he declares:

"That no work of merit on mathematics was produced by Romans is well known. The same was true of astronomy. In the natural sciences Pliny was the outstanding figure, but his work was mere compilation and much of it was worthless. Medicine did not fare much better."

From Rome, it appears, we can learn that it takes more than the economic factor alone to stimulate science, despite those who would reduce history, as well as politics, to economic formulas.

Science News Letter, February 4, 1939



LIGHT ON THE SPOT

Light "piped" through a curved rod of Lucite can be concentrated exactly where it is most needed, for all kinds of surgical and dental work.

plastic can be molded and polished to keep the light within it; at the desired point the surface is broken and the light pours out there.

Science News Letter, February 4, 1939

RESEARCH

List Shows University Research Expenditures

LEADING universities of the nation in research expenditures are California, Chicago, Columbia, Harvard, Illinois and Michigan, according to a survey contained in the report of the National Resources Committee by its science subcommittee. These six schools spend over \$2,000,000 a year on research each.

In the group spending between \$1,500,000 and \$2,000,000 a year for research are Cornell, Minnesota, Wisconsin and Yale.

In the \$1,000,000 to \$1,500,000 bracket are four schools: Massachusetts Institute of Technology, New York University, Ohio State University and the University of Pennsylvania.

Spending between \$500,000 and \$1,000,000 yearly for research are: Duke, University of Iowa, Iowa State College, Johns Hopkins, Missouri, Nebraska, Northwestern, Penn State, Princeton, Purdue, Rochester, Rutgers, Stanford and Texas A. and M.

Science News Letter, February 4, 1939

NATURE CAMP

*Inspiring . . . Instructive
Healthful . . . Enjoyable*

All outdoors beckons you to a summer of self-improvement in the heart of Central Pennsylvania's picturesque mountains. A Camp unexcelled for location, food, and variety of attractions. Famous State monuments and game refuge nearby; birds, wild animals and rare plants in rich profusion. Congenial fellow students. Camp program under the competent direction of expert field naturalists. Field work for science teachers.

FIRST SESSION—June 29-July 20

SECOND SESSION—July 19-August 9

WRITE NOW for illustrated booklet.
Address: Professor George R. Green,
Director of the Nature Camp—

The Pennsylvania State College
State College Pennsylvania

SCIENCE NEWS LETTER SUBSCRIPTION COUPON

To Science News Letter, 2101 Constitution Avenue, Washington, D. C.

☐ Start my subscription to SCIENCE NEWS LETTER for ☐ 1 year, \$5
☐ Renew ☐ 2 years, \$7

Name _____

Street Address _____

City and State _____

(No extra postage to anywhere in the world)



Rooted Successes

Plantings of trees by the U. S. Soil Conservation Service are based on requirements different from those of any other branch of arboriculture. Everyone else who plants trees thinks of returns for his labor in terms of their tops: wood, fruit, nuts, ornament, shade, encouragement of wildlife, shelter from the wind, etc. And sites are always chosen in which the trees seem likeliest to survive and thrive.

The soil conservationist alone thinks in terms of roots. He plants his trees primarily for the living underground ropes they will provide; tops, save as umbrellas to check surface wash, are incidental. Also, he has to take the sites provided by his problem, and they are almost always the least promising: caving gullies, naked sterile clay, drifting dunes.

Under the circumstances, the soil conservationist might be expected to be a defeatist, always looking to see his labors perish of drought or washed away in freshets. Yet a summary of plantings to date, offered in *The Journal of Forestry* (Jan.) by John F. Preston of the U. S. Soil Conservation Service, shows both self-exacting standards and a reasonable degree of optimism.

To date, some 350 million trees have

been planted on about 218,000 wasting acres by the Soil Conservation Service. Of this acreage, it has been possible to check back on about half. Over 70 per cent. of the acreage thus examined was

found to have its plantings in satisfactory condition; the remainder, with half or more of the trees dead, was rated unsatisfactory and marked for replanting.

Science News Letter, February 4, 1939

ANTHROPOLOGY

The Savage Gets a Break: Sanctuaries Planned For Him

Wild animals at present receive more care and consideration, in most parts of the world, than do wild human beings. Preserves and sanctuaries are arranged for our lesser cousins in fur, feathers or scales, but for the poor brown brother there has long been nothing but exploitation or extermination.

At last there are signs that some savage tribes are going to get at least as good a break as ducks or gorillas. In several tropical colonial areas, what might be called "savage sanctuaries" are being planned. They will not be like our Indian reservations, which were places where the Redmen were penned to keep them from getting at the white men who had taken their hunting grounds. Quite oppositely, they are to be places where the white men can get at them only under conditions calculated to render the intruder as nearly harmless as possible.

This movement is largely the work of scientists, particularly anthropologists and ethnologists, who have seen some primitive peoples vanish altogether be-

fore they could study and record them and their ways, and they have seen others so changed by contacts with civilization that they could no longer yield data of real scientific value.

A typical case are the sanctuaries planned, and now being surveyed, in the Netherlands New Guinea. There, some tribes live in the highlands who have had so little contact with white men that they are still practically in the Stone Age. Ultimately, access by missionaries and (under restrictions) by traders, will be permitted. But first, thorough scientific studies of the people and their environment will be made.

The inmost lands, far up in the interior mountains, are planned to become the permanent sanctuaries of the shyest, most primitive of all the aborigines.

It all arouses the ironical reflection that in some of the world's erstwhile highly civilized lands there are hundreds of thousands of white men who must be wistfully wishing they were these poor, benighted but protected savages!

Science News Letter, February 4, 1939

GEOLOGY

Ice Age Stages Traced In Tropic Lands of Asia

WHAT were the tropical lands like during the Pleistocene Ice Age? This often-asked question was taken up by Dr. Hellmut de Terra, research associate of the Carnegie Institution of Washington, who has spent some years exploring the southern slopes of Asia, from the Siwalik Hills of northern India to the remote interior of Burma.

During the Ice Age, corresponding perhaps to the major advances of the great glacial sheets from the north, there were four major glaciations in the Himalayas, Dr. de Terra reported. There are four zones of gravelly or silty compositions, separated from each other by

major breaks which coincide with interglacial stages, he said. These are uniformly developed all over continental southern Asia, and afford a means by which cycles of soil making and sedimentation can be correlated.

Prehistoric man was an unconscious calendar-maker for his modern scientific successors in this study. The rude stone tools he made, and the bones of the animals he hunted (and that sometimes turned the tables and hunted him) are valuable aids in "dating" these four periods of glacial deposition.

Science News Letter, February 4, 1939

● RADIO

Dr. Walter B. Cannon, Harvard physiologist, president of the A. A. A. S., will be guest scientist on "Adventures in Science" with Watson Davis, Director, Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, Feb. 9, 7:15 p. m. EST, 6:15 p. m. CST, 5:15 p. m. MST, 4:15 p. m. PST. Listen in to your local station. Listen in each Thursday.

What one Issue (January) of Consumers Union Reports can do for you

1. Guide you to a "Best Buy" in a RADIO-PHONOGRAPH combination, perhaps save you a considerable sum by pointing out which instruments ranked highest for tone quality and faithfulness of reproduction and which may be expected to perform more satisfactorily than other instruments of the same general type in the same general price range. (Pages 12 to 16.)
2. Tell you by brand name which HAIR DYES are most effective, which may cause serious skin disorders, which are relatively ineffective, how to find out beforehand whether any particular brand will harm you. (Pages 3 to 6.)
3. Show you why industrial or "Five-and-Dime" LIFE INSURANCE has been called "the greatest life insurance wrong." (Pages 10 and 11.)
4. Give you the results of laboratory tests for the comparative value of 25 muslin and percale SHEETS, show you how by buying a "Best Buy" brand instead of a "Not Acceptable" one you can save 40c on each sheet, and tell you what to look for on sheet labels. (Pages 21 to 24.)
5. Tell you what sales items in the annual department store "Clearance," "White," "Furniture," and "Baby" sales you are most apt to make genuine savings on and which of these sales are apt to be frauds. (Pages 26 to 29.)
6. List for you the names of the patent medicine preparations which contain the drug the Food and Drug Administration is now taking action against and about which it says: "There is now no doubt that this drug has been responsible for numerous deaths." (Page 29.)
7. Warn you of the hazards of home dry cleaning; warn you against investing in certain types of saving plan associations now mushrooming around the country, and show you how a few simple habits in caring for your electric irons, floor lamps, toasters, radios and other electric appliances may save you expensive repair jobs. (Pages 7 to 9, 31 to 35.)

Even casual use of this information may save you several times the cost of subscription to this magazine and help you steer clear of worthless or dangerous products. If one issue can do this, think of what 12 will do for you! Cut out and mail the coupon below today. We'll immediately send you the January issue. In April you'll receive without extra charge the 1939 BUYING GUIDE, a pocket-size handbook containing ratings by brand names as "Best Buys," "Also Acceptable," and "Not Acceptable" of most of the products you buy.

To: CONSUMERS UNION of U. S., INC.
17 Union Square W, New York, N. Y.

Send me CONSUMERS UNION REPORTS for one year and the 1939 BUYING GUIDE when it appears. I enclose \$3. I agree to keep confidential all material sent to me which is so designated.

Name _____

Address _____ 1 L 9

•First Glances at New Books

Botany

NATIVE WOODY PLANTS OF THE UNITED STATES; THEIR EROSION-CONTROL AND WILDLIFE VALUES—William R. Van Dersal—*Govt. Print. Off.*, 362 p., illus., 2 maps, \$1.75. An intensely practical book that will be of great value both to workers in the Soil Conservation Service and to landowners who are interested enough in keeping their heritage to do some planting on their own account. Shrub and tree species are listed alphabetically; with each is given its usefulness as a soil-holder, its value as a food or shelter plant for wildlife, and other essential data. Valuable appendices include a 649-title bibliography and an identification list of common names.

Science News Letter, February 4, 1939

Forestry

THE NORTH AMERICAN ASSAULT ON THE CANADIAN FOREST—A. R. M. Lower, W. A. Carrothers and S. A. Saunders—*Yale Univ. Press*, 377 p., \$3.75. Much of American building has been made possible through lumber imported from Canada, and at the present time the greater part of the vast quantities of newsprint that go into our huge newspaper and magazine editions come from that Commonwealth. What this forest products traffic has meant for Canada, in both good and ill, is told in detail in this scholarly book.

Science News Letter, February 4, 1939

General Science

THE LOG OF THE SUN—William Beebe—*Holt*, 321 p., \$2.50. A new printing of a book done by Will Beebe long ago, but as fresh now as it was then. It goes through the year month by month, helping us to see the world with a naturalist's eyes.

Science News Letter, February 4, 1939

Astronomy

BRUCE PROPER MOTION SURVEY. I. First Report, 5 p., 50 c. **II. A Catalogue of 2350 Variable Stars Found with the Blink Microscope**, 40 p., 50 c.—Willem J. Luyten—*Univ. of Minnesota Press*.

Science News Letter, February 4, 1939

Archaeology

PAJARITO PLATEAU AND ITS ANCIENT PEOPLE—Edgar L. Hewett—*Univ. of New Mexico Press*, 191 p., \$4. Written for readers who are interested in archaeology generally, rather than for a specialized few who might be concerned

with technical problems in the Southwest, this book discusses the Indians who lived in pueblos and cliff dwellings in one region of New Mexico.

Science News Letter, February 4, 1939

Radio

HANDBOOK OF RADIO DRAMA TECHNIQUES—Donald W. Riley—*Edwards*, 77 p., \$1.40. Intended for beginners interested in radio drama from any angle, this small book deals mainly with production problems such as rehearsals, casting, and acting. A few points on writing are given.

Science News Letter, February 4, 1939

General Science

COOPERATION IN RESEARCH—*Carnegie Institution of Washington*, 782 p., \$4.50, paper; \$5., cloth. An impressive report of researches of a great institution during the presidency of Dr. John C. Merriam. It is one of these summarizing volumes for which the future as well as the present will be thankful.

Science News Letter, February 4, 1939

General Science

PUBLISHED PAPERS AND ADDRESSES OF JOHN CAMPBELL MERRIAM—*Carnegie Inst. of Washington*, 4 volumes, 2672 p., paper, \$4.50 per volume; cloth, \$5 per volume; per set, \$18, paper, \$20, cloth. As Dr. Merriam lays aside administrative cares as president of the Carnegie Institution to devote more time to research, he is greeted by this magnificent and useful recording of published works. It is a fitting tribute to the fruitful years of his presidency.

Science News Letter, February 4, 1939

Museum Science

SEVENTY-FIVE YEARS; A History of The Buffalo Society of Natural Sciences 1861-1936—*The Buffalo Society of Natural Sciences*, 204 p., illus., \$2. A jubilee volume which everyone interested in museums and their modern development will want to examine. The tremendous progress that has been made in popular exposition of science during three-quarters of a century is vividly brought out here.

Science News Letter, February 4, 1939

Economics

SOCIAL INSURANCE COORDINATION—C. A. Kulp—*Social Science Research Council*, 333 p., \$2.50. An analysis of German and British organization.

Science News Letter, February 4, 1939

Archaeology

THE APE IN ANTIQUITY—William Coffman McDermott—*Johns Hopkins Press*, 338 p., pl. \$5. The author has searched systematically and minutely through all possible documents, all the way from Egyptian papyri and Greek vases through medieval manuscripts. The result is a most interesting conspectus of what men of all nations have thought about apes from the earliest times.

Science News Letter, February 4, 1939

Agriculture

ANCIENT AND MODERN AGRICULTURE—A. K. (Dad) Short—*Naylor Co., San Antonio*, 158 p., \$2. Essentially this is a Biblical concordance of agricultural and related words and phrases, of considerable interest as showing the existence in the relatively primitive agriculture of two and three thousand years ago of the same basic implements and processes used by even the most modern of mechanized farming.

Science News Letter, February 4, 1939

Psychology

CLINICAL AND EXPERIMENTAL STUDIES IN PERSONALITY (Rev. ed.)—Morton Prince; A. A. Roback, ed.—*Sci-Art*, 671 p., \$6. An enlarged edition of a well-known book.

Science News Letter, February 4, 1939

History

OPENING AND PENETRATION OF FOREIGN INFLUENCE IN SAMOA TO 1880—Joseph W. Ellison—*Oregon State Coll.*, 108 p., 50 c.

Science News Letter, February 4, 1939

Aeronautics—Juvenile

SKYWAYS—Charles Gilbert Hall—*Macmillan*, 141 p., illus., \$1.50. A brief, lavishly illustrated history of aviation.

Science News Letter, February 4, 1939

Medicine

SYPHILIS—Forest Ray Moulton, ed.—*Science Press*, 193 p., \$2.50. This volume contains the 30 papers by 32 authors presented at the syphilis symposium held by the section on medical sciences of the American Association for the Advancement of Science in 1937.

Science News Letter, February 4, 1939

Medicine

MANUAL OF MEDICAL PARASITOLOGY—C. Courson Zeff — *Edwards*, 65 p., \$2.50. A laboratory manual for pre-medical students by the assistant professor of zoology at Pennsylvania State College.

Science News Letter, February 4, 1939